Name:

at1124exam: Radicals and Squares (v919)

Question 1

Simplify the radical expressions.

$\sqrt{98}$	$\sqrt{8}$	$\sqrt{99}$
$\sqrt{7 \cdot 7 \cdot 2}$	$\sqrt{2 \cdot 2 \cdot 2}$	$\sqrt{3 \cdot 3 \cdot 11}$
$7\sqrt{2}$	$2\sqrt{2}$	$3\sqrt{11}$

Question 2

Find all solutions to the equation below:

$$\frac{(x-6)^2}{2} + 8 \;=\; 58$$

First, subtract 8 from both sides.

$$\frac{(x-6)^2}{2} = 50$$

Then, multiply both sides by 2.

$$(x-6)^2 = 100$$

Undo the squaring. Remember the plus-minus symbol.

$$x - 6 = \pm 10$$

Add 6 to both sides.

$$x = 6 \pm 10$$

So the two solutions are $x = 16$ and $x = -4$.

Question 3

By completing the square, find both solutions to the given equation. *You must show work for full credit!*

$$x^2 + 14x = 95$$

$$x^2 + 14x + 49 = 95 + 49$$
$$x^2 + 14x + 49 = 144$$
$$(x + 7)^2 = 144$$
$$x + 7 = \pm 12$$
$$x = -7 \pm 12$$
$$x = 5 \quad \text{or} \quad x = -19$$

Question 4

Any quadratic function, with vertex at (h, k), can be expressed in vertex form:

$$y = a(x - h)^2 + k$$

A quadratic function is shown below in standard form.

$$y = 3x^2 + 30x + 81$$

Express the function in **vertex form** and identify the **location** of the vertex.

From the first two terms, factor out 3 .

$$y = 3(x^2 + 10x) + 81$$

We want a perfect square. Halve 10 and square the result to get 25 . Add and subtract that value inside the parentheses.

$$y = 3(x^2 + 10x + 25 - 25) + 81$$

Factor the perfect-square trinomial.

$$y = 3((x + 5)^2 - 25) + 81$$

Distribute the 3.

$$y = 3(x + 5)^2 - 75 + 81$$

Combine the constants to get **vertex form**:

$$y = 3(x + 5)^2 + 6$$

The vertex is at point $(-5, 6)$.